TECHNOLOGY FACTSHEET

SOLAR DRYERS [1]

Introduction

Solar drying involves the removal of moisture from produce so as to provide a product that can be safely stored for longer periods.

The solar drying method uses indirect solar radiation. The principle of the solar drying technique is to collect solar energy by heating-up the air volume in solar collectors and conduct the hot air from the collector to an attached enclosure.

Drying is an important step in the food production process. The main argument for food drying is to preserve the food for longer periods of time. However, it is important to note that the process is not just concerned with the removal of moisture content from the food. Additional quality factors are influenced by the selection of drying conditions and equipment:

- Moisture Content. It is essential that the foodstuff after drying is at moisture content suitable for storage. The desired moisture content will depend on the type of food, duration of storage and the storage conditions available. The drying operation is also essential in minimizing the range of moisture levels in the batch of food as portions of under-dried food can lead to deterioration of the entire batch.
- Nutritive value. Food constituents can be adversely affected when excessive temperatures are reached.
- Mould growth. The rate of development of micro-organisms is dependent on the food moisture content, temperature and the degree of physical damage to the food.

Appearance and smell of the food. For example, the colour of milled rice can be adversely affected if the paddy is dried with direct heated dryers with poorly maintained or operated burners or furnaces.

Technology Characteristics

The solar dryer is a relatively simple concept. The basic principles employed in a solar dryer are:

- Converting light to heat: Any black on the inside of a solar dryer will improve the effectiveness of turning light into heat.

[1] **This fact sheet has been extracted from TNA Report – Mitigation for Kenya. You can access the complete report from the TNA project website** http://tech-action.org/

- Trapping heat: Isolating the air inside the dryer from the air outside the dryer makes an important difference. Using a clear solid, like a plastic bag or a glass cover, will allow light to enter, but once the light is absorbed and converted to heat, a plastic bag or glass cover will trap the heat inside. This makes it possible to reach similar temperatures on cold and windy days as on hot days.

Moving the heat to the food: Both the natural convection dryer and the forced convection dryer use the convection of the heated air to move the heat to the food.

Country Specific Applicability and Potential

Kenya lies along the equator and receives enough sunshine during the year. There is potential for applying solar dryers to dry cereals such as maize, wheat and rice after harvesting. These cereals are widely grown in the country both by small households and in large farms.

Status of technology in country

In Kenya, GIZ has played a key role in introducing the technology. Most of the work was with simple direct, lowest cost type solar dryers. Such "simple" designs use frames made of wood, inside which screen trays are laid. A UV resistant plastic film is used as a cover.

KIRDI is actively working with institutions and women's groups in developing improved dryers for processing of fruits, vegetables and cereals on a commercial basis.

Benefits to economic/social and environmental development

Solar drying is not simply a method for substituting fossil fuels by solar energy, but it is a technological process for producing dried materials of the required quality to replace fuel use. The country will save on foreign exchange used to import fossil fuel.

Climate change mitigation benefits

Solar dryers can replace use fossil fuel used to generate electricity to dry tea leaves. The mitigation potential is in the range of 5,000kt$CO_{2/year}$ in 2030 (IISD (2012)

Financial requirements and costs

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